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Image Theory is a descriptive theory of decision making for import ant personal decisions. It focuses on personal policies as the determinants of goals, strategies as methods of attaining goals, passive decision processes as the prime method of decision making, congruence with criteria (rather than maximization) as the prime consideration in selecting alternatives, and decision implementation as the major source of difficulty in carrying out decisions.

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Image Theory:  Principles, Goals,

and Plans in Decision Making

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## Abstract

A descriptive theory of decision making is proposed in which Decision Makers represent information as images. One image consists of principles that recommend pursuit of specific goals. A second image represents the ideal state of events if these goals were to be attained. A third image consists of the plans that have been adopted to pursue those goals. A fourth image represents the anticipated state of events if the plans on the third image are implemented. Decisions consist of (1) adopting or rejecting potential candidates to be new principles, goals, or plans, and (2) determining whether progress toward goals is being made, i.e., whether the ideal future and the anticipated results of plan implementation correspond. Decisions are made using either (1) nonanalytic strategies that rely solely upon the compatibility between candidates and existing principles, goals and plans, or the compatibility between the images of the ideal and the anticipated states of events, or (2) analytic strategies that rely upon both compatibility and the gains and losses offered by a goal or plan.

# Image Theory: Principles, Goals, and Plans in Decision Making

Lee Roy Beach and Terence R. Mitchell

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Expected Value Maximization (EV) has been the dominant theory of decision making for the past 30 to 40 years, commonly regarded as starting in economics with Von Neumann and Morganstern (1944) and in psychology with Edwards (1954). From nearly the beginning there has been controversy about EV's descriptive adequacy (e.g., Allais, 1953). As evidence has accumulated, particularly in psychology, there has been a growing disenchantment with EV that recently has become open rejection of the theory's descriptive validity (Abelson & Levi, 1985).

In part, this disenchantment comes from recognition that EV is virtually untestable (Tversky, 1967). The robustness of its linear form assures it can account for a great deal of the decision data (Dawes & Corrigan, 1974), even when these data are generated by obviously non-EV processes (Fischhoff, Goitein & Shapira, 1983). In part, the disenchantment comes from clear deviations of decisions from EV theory, even when Decision Makers endorse the theory's axioms (Kahneman & Tversky, 1979). And, in part, the disenchantment comes from close examinations of what Decision Makers actually do when they make decisions. These examinations produce conclusions such as ". . . the problem may well be . . . that subjects just do not follow expectation models" (Hershey & Shoemaker, 1980, p. 417), or ". . . there is a nagging suspicion that expectancy theory overintellectualizes the cognitive processes people go through when

choosing alternative actions" (Schwab, Olian-Gottlieb & Heneman, 1979,
p. 146), or "The story of behavioral decision theory has . . . been
the growing realization that [EV] often does not describe the
decision-making process . . . The dramatic tension has been provided
by [EV's] remarkable ability to hang on despite mounting doubts about
its descriptive competence" (Fischhoff, Goitein & Shapira, 1983, p.
185).  Of course, Nobel Prizewinner Herbert Simon's arguments in this
vein are well known (e.g., Simon, 1957), but both economists and
psychologists have been slow to recognize the implication for EV
theory of both Simon's arguments and similar arguments made by other
researchers.

To a large degree, the reluctance to abandon EV theory comes from
the want of an attractive theoretical alternative.  This, in part,
arises from the fact that because EV theory dictates a concept of
decisions that has become the conventional way of characterizing them
it naturally appears to be the best way of doing so.  In this
characterization the Decision Maker has an array of alternative
actions, an appreciation of each action's potential ramifications, the
desire to select the action with the most attractive potential, and
the time and capacity to thoroughly ponder the decision before making
it.

To suggest that Decision Makers do not always appear to select
the most attractive alternative, maximize, is not to suggest that they
necessarily do the opposite, minimize.  But, the fact remains that
this aspect of the characterization, as well as each of the other
aspects, fails to describe most of the decisions that have been
studied carefully.  Mintzberg (1975), studying management decisions,
for example, found that managers seldom focus on more than one option.

Their decisions usually are about whether to act or not, rather than about selecting one alternative from an array of alternatives. Peters (1979) confirmed Mintzberger's findings and, in addition, observed that " . . . . managers seldom deal with problems in isolation. They deal with a flow" (p. 167) and the criterion for the individual yes-no decisions in that flow is "Does this option contain the thrust we want to see?" (p. 166). Peters' (1979) research revealed decisions to be ways of directing the ongoing flow of the organization's activities and they seldom diverted the flow by very much. There seldom were large or abrupt changes. Rather, managers gently 'nudged' the flow to keep things moving in the proper direction. Peters (1979) agrees with Selznick's (1957) conclusion that the decision making manager " . . . is primarily an expert in the promotion and protection of values," a point upon which we will elaborate later.

These and similar studies demonstrate that Decision Makers have neither the skills, the capacity, nor the inclination to perform the thorough analyses prescribed by EV theory (Slovic, Lichtenstein & ischhoff, 1985). Indeed, only for very simple problems and in circumstances that allow for almost no other course (e.g., Gray, 1975) do they appear to be able to, or inclined to, use methods resembling EV maximization.

One way of dealing with the descriptive inadequacy of EV theory is to retain it but to modify it to make it compatible with the data. After all, both researchers and Decision Makers endorse the theory's basic logic and its simple mathematics makes it theoretically attractive. Prospect Theory (Kahneman & Tversky, 1979) is the example of this retain-and-modify approach that is most familiar to psychologists. However, even when it is done well, as in the case of

Prospect Theory, this approach is hauntingly reminiscent of epicycles straining to save the Ptolomaic theory of the solar system; a rearguard action in a lost cause. Instead, what seems to us to be needed is a theory that retains only the most plausible aspects of the EV logic, while providing a substantially different approach.

What follows is a suggestion for that different approach. It is an attempt to account both for those infrequent occasions on which decision behavior resembles something like EV maximization, and for those vastly more frequent occasions on which decisions are made in a very different way. The theory is called Image Theory, for reasons that will become clear. We begin with a discussion of the theory's background.

## Background

Image Theory is based upon the increasingly accepted view that Decision Makers use different methods (strategies) for making different decisions, depending upon their abilities, the characteristics of the decision at hand, and the context in which the decision arises (e.g., Beach & Mitchell, 1978; Christensen-Szalanski, 1978, 1980; Murray, 1978; Nutt, 1976; Paine & Anderson, 1977; Payne, 1982). In most analyses these strategies end up being divided into two broad categories which we will call analytic and nonanalytic. Analytic strategies consist of attempts to be fairly precise in the evaluation of the potential gains, losses, etc. involved in the decision, and may rely upon the use of tools such as decision trees, value trees, and other EV-based aids, or may merely consist of trying to do a good job of evaluating the decision, but doing it in one's head without the use of tools. The nonanalytic strategies are less well specified, but consist of rougher, less precise evaluations of

the decision alternatives and, may rely upon things like rules of thumb, advice from others, habit, or simply upon rather passively doing whatever 'feels right' (Markus & Zajonc, 1985). Many researchers (e.g., Beach & Mitchell, 1978; Cohen, March & Olsen, 1972; Mintzberg, Rausingham & Theoret, 1976; Peters, 1979), have argued that people tend to make most of their decisions, even rather important ones, using nonanalytic strategies. Image Theory is an attempt to clarify the conditions that prompt the use of analytic and nonanalytic decision strategies, and to explore in more detail the predominant role of nonanalytic strategies in day-to-day decision making.

Image Theory is based in part upon what has come to be called control theory. In psychology, control theory was most straightforwardly used in the work of Miller, Galanter, and Pribram (1960), although it permeated much of the rest of psychology. It has received renewed vigor from the work of Powers (1978), Carver and Scheier (1981; 1982), and Lord and Hanges (1985), among others. The general idea is that behavior is guided by goals, feedback, and the evaluation of the 'fit' between the two that informs the actor about whether progress toward the goals is being made. The Miller et al. (1960) book introduced the TOTE (test, operate, test, exit) system as a way of describing this fitting process. However, the TOTE unit is a simplistic control mechanism that never was worked out in much detail in the book. Greater attention was given to (1) images, which are private representations of the actor's self and his or her world, that give rise to (2) plans, that guide behavior. Computer programs served as the metaphor for plans, and the general idea was that the actor implements a plan in order to realize an image (i.e., to make reality conform to some favored state of affairs), and the TOTE feedback

system permits monitoring of the plan's progress toward that realization. In Image Theory, the Miller et al. notions of images and plans are adopted and generalized specifically to decision making.

While recent developments in control theory have focused on elaboration of the control mechanisms, the literature in personal development (e.g., Neugarten, 1977; Levinson, Darrow, Klein, Levinson & McKee, 1978), career development (e.g., Rhodes & Doering, 1983; Mihal, Sorce & Comte, 1984), and philosophy (e.g., MacIntyre, 1981) has begun to focus on images. Generally, images are described as both recollections and reconstructions of the past (where one has been) and expectations and aspirations for the future (where one hopes to go). In reference to the future, MacIntyre says, "There is no present which is not informed by some image of some future and an image of the future which always presents itself in the form of a _telos_ – or a variety of ends and goals – towards which we are either moving or failing to move in the present" (1981, p. 200).

Image Theory also builds on the organizational (Staw, 1981; Northcraft & Wolf, 1984) and social psychological (Brockner & Rubin, 1985) literature on commitment and entrapment. These terms describe the observation that in many situations people tend to stick with the status quo even when 'rational analysis' would prescribe a change. This same tendency has been observed in decision work (e.g., Davidson & Beach, 1981; March & Simon, 1958).

Finally, to return to our opening remarks, Image Theory grows out of dissatisfaction with EV theory. Certainly EV can be used to account for a great deal of decision behavior, particularly aggregate data for large groups of people, as in economics. But, it does not describe how the members of those groups of people describe what they

are doing (Mintzberg, 1973, 1975; Mintzberg, Rausingham & Theoret, 1976; Peters, 1979). While it is true that different theories are appropriate for different levels of explanation, and that a satisfactory theory need not conform to subjects' beliefs about what they are doing, it nonetheless seems appropriate to pay attention to what Decision Makers say they are trying to do and how they are trying to do it. This view is supported by experience with decision aiding systems that attempt to impose EV on the users, attempts that often are frustrated by strong user resistance (Beach, 1983). It also is supported by our subjects', students', and colleagues' incredulity about the prescriptive superiority of EV maximization; they frankly state that while EV may indeed have merit, they cannot imagine using it unless they were at their wit's end about a decision, and probably not even then—a view that echoes the findings by Mintzberg (1975), Peters (1979) and others. Additional support is provided by professional decision analysts, who have told us that when the results of a decision analysis are at odds with the client's 'gut feeling,' the gut feeling almost always prevails. This candid observation is confirmed by Isenberg (1984), who found that most of the senior executives in his study ". . . are familiar with the formal decision analysis models and tools, and those that occasionally use such systematic methods for reaching decisions are leery of solutions that these methods suggest that run counter to their sense of the correct course of action" (p. 86; note also the use of the word 'occasionally' in the quote). Clearly, whatever its attractions in the abstract, when it comes to making concrete decisions, EV may not be particularly compelling.

Before presenting our alternative to EV theory, it is important

to identify Image Theory's form and where it fits in the spectrum of psychological theories. It usually is possible to categorize psychological theories either as process theories or as structural theories (see Pylyshyn, 1980). Process theories attempt to describe what is going on, usually internally, as the actor engages in a behavior that lies within the domain of the theory. In doing this, process theories tend to emphasize descriptive depth at the price of descriptive breadth. That is, they usually deal with fairly molecular behaviors (often in highly defined laboratory tasks) that are assumed to be the substratum of molar behaviors that lie outside the domain of the theory.

In contrast, structural theories emphasize descriptive breadth at the price of descriptive depth, at least at the price of precise process description. In doing this, structural theories tend to emphasize the behavior's place in the broader context of the events and circumstances that surround it—the theory's domain is more molar than that of the process theories. All of the theories described above are structural theories, including EV theory. They do not attempt to describe what goes on within the actor; strategy selection theories do not specify the precise cognitive processes underlying the use of various decision strategies, control theory does not specify exactly how actors make use of feedback to modify behavioral effectiveness, and, other than some rather common sense speculations, neither commitment theory nor entrapment theory give precise details about how actors get themselves into the difficulties that they do. Moreover, even though the mathematical formula for computing alternatives' EV's may appear to be a process theory, it is not. Psychologists have long since learned that the proceedural

prescriptions of predictive equations are not necessarily isomorphic with the psychological processes that generate the behavior that is predicted (Hoffman, 1960).

Image Theory too is a structural theory. As with other structural theories, its constructs are classes of only generally defined circumstances and processes. It is assumed that the specific circumstances and processes that obtain on any particular occasion for any particular Decision Maker in principle could be assigned to the classes that constitute the constructs of the theory, and that the theoretical relationships among those constructs hold for the circumstances and processes in question. Although the language used in the presentation of the theory often may suggest process, this merely is a concession to readability; strict structural description is stilted and difficult to read. However, it is important for the reader to interpret what follows as an (abstract) structural description of decision making rather than as a (concrete) process description because doing so can forestall needless contention about process and can facilitate understanding of the theory on its own level.

Finally, for those accustomed to the EV characterization of decisions, perhaps the least attractive aspect of Image Theory is the absence of mathematical terminology and formalization. The reasons for this absence are quite straightforward. First, as often has happened with EV theory, mathematical equations tempt interpretation as process descriptions. As the present discussion has been at pains to make clear, Image Theory is not an attempt to describe process. Therefore, absence of equations discourages misinterpretations. Second, the lessons of EV theory's overpredictive, robust linear form

are not to be ignored (Dawes & Corrigan, 1974), and the appropriate
alternative to a linear form is not apparent. And third, the most
important reason is that mathematical formalization both requires and
implies considerably more concrete knowledge about the specifics of
the theory than presently exists. This is the beginning and it is
premature to hazard guesses about the form that mathematical
formalization eventually may require.

### Image Theory in Brief

The following overview of Image Theory is to help the reader
maintain his or her bearings during the subsequent elaboration of the
theory.

The general idea is that Decision Makers represent information as
images. They have images of how things should be, and they have
images about what they should do to make things that way. In the
main, decisions consist of adopting new goals to pursue, adopting
plans to pursue these goals, and of determining whether progress
toward those goals is so insufficient as to warrant a change in plan
or a change in goal.

Images: (1) The self image, consists of principles that dictate
which goals the Decision Maker pursues. (2) The trajectory image,
consists of how and when the goals ideally should be attained. (3)
The action image, consists of plans for reaching the goals. (4) The
projected image, consists of what can be anticipated to occur if
current plans continue to be implemented.

Decision Types: (1) Adoption decisions, bout whether to adopt
or reject candidates to become principles, goals, or plans, and (2)
Progress decisions, about whether there is sufficient incompatibility
between the trajectory and projected images to warrant abandonment of

the current plan and adoption of another one.

Evaluative Criteria: (1) Compatibility, (a) the degree to which
a particular candidate for adoption 'fits in' with existing
principles, goals, or plans, or (b) the degree to which the trajectory
and projected images are congruent with one another, i.e.,how well the
plan is progressing. (2) Profitability, the degree to which a
particular candidate for adoption appears to offer positive
consequences over and above compatibility alone. To the degree that a
candidate for adoption is compatible with existing image constituents,
or is profitable, it is said to be attractive. Doubt about
attractiveness diminishes (discounts) it.

Decision Rules: (1) Satisficing (Simon, 1957, 1976), when a
candidate's attractiveness exceeds some sufficiency threshold, or (2)
maximizing (Edwards, 1954), adoption of the most attractive candidate
when there are competing candidates of sufficient attractiveness.
Progress decisions are made only by application of the satisficing
rule.

Decision Strategies: (1) nonanalytic strategies based upon
sufficiency of compatibility and application of the satisficing
decision rule, and (2) analytic strategies based upon both
compatibility and profitability and application of the maximizing
decision rule.

Decision Contexts: (1) Optional contexts in which continuing
with the status quo is one of the available alternatives and change is
optional, and (2) nonoptional contexts in which the status quo ceases
to be a possibility and change is inevitable.

The elements of Image Theory are summarized in Figure 1.

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Insert Figure 1 about here.

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A point about exposition before we proceed to the details of the theory. To make things concrete, from time to time we will use as examples decisions being made by a hypothetical Dr. Smith, a woman who is in her late twenties, single, holds a Ph.D. in Psychology, and who has been an Assistant Professor of Organization and Administration for one year in the business school of a large state university.

## Elements of the Theory

### Informational Representations: Images

We have elected to call the four different forms of informational representations 'images' because Miller et al. used this term, and because of the term's visual connotations. Similarly, the components of the images are referred to as 'facets.' This is not to suggest that images or facets are visual per se, but they are seen as having something of a perceptual quality (e.g., the trajectory image extends into the future) that goes beyond mere verbal lists of items. Terms like 'schema' or 'knowledge structure' could as well have been used (Marcus & Zajonc, 1985), but because the theory relies upon such pattern-like concepts as compatibility, congruence, and fittingness in reference to these representations, 'image' seems a most descriptive term.

The Self Image consists of who one is and what one regards as appropriate and comfortable for oneself. It is what most of us regard as our 'self,' our 'personality.' It embodies one's morals, one's values, one's beliefs, and one's views about what is proper and

appropriate.

The components (facets) of the self image are called <u>principles.</u> They are the imperatives that guide one's selection of goals to pursue or to eschew; they are the personal principles that govern one's choice of actions in pursuance of those goals that are adopted. For example, our Dr. Smith's principles include personal and professional codes that prescribe behavior both within the university and outside of it. She sees herself as a dedicated scientist and teacher. She also sees herself as honest, trustworthy and professionally committed, but her job is only one part of her life which includes hobbies, appreciation of the arts, participation in sports, and active membership in her church. These self descriptions, and their attendant principles, give her stability and guide her behavior.

In addition to being used to generate goals and actions, principles also are used to audit externally introduced potential goals and actions and to veto those that are incompatible with one's principles. In short, a principle is a reference point that defines the acceptability to the Decision Maker of a candidate goal or plan in light of its congruence with that principle.

For all of their importance, principles seldom, probably never, are adopted with a view to what they will yield in terms of external consequences, payoffs, or rewards. Instead, principles are viewed as inherently good in and of themselves (Note 1). Indeed, candidate principles are evaluated and adopted solely in terms of a single implication - whether or not they are compatible with existing principles. That is, the attractiveness of a candidate principle is based solely upon how well it <u>fits in</u> with existing facets of the self image. The result of this, of course, is a high degree of internal

consistency for the self image -- an internal consistency that one seeks to maintain (e.g., Carver & Scheirer, 1981, 1982; Greenwald, 1980), and the violation of which leads to anomalo ; behavior (e.g., Cooper & Croyle, 1984).

Principles are abstract rules to live by. However, they refer to concrete events and states. Events are happenings: they have a limited span of occurrence -- one graduates, gets married, has surgery. States are being: they often are sequelae of events, but also they often arise during progress toward an event, in anticipation of it, as well as being an aftereffect -- being expectant, being successful, being a professor, being a parent, being bored. Events and states are the focal point of decisions; are they sufficiently compatible with one's principles to justify pursuing them, and if pursuit is elected, is progress being made?

The Trajectory Image consists of one's view about where, ideally, one is going; the blueprint, however vague, for how one thinks the present should be and how future events and states should unfold; the ends (or acknowledged lack thereof) one elects to pursue in light of one's self image; the landmarks one anticipates along one's idealized life course. The facets (events and states) of the trajectory image are called goals (Jungermann, von Ulardt & Hausmann, 1983).

Goals can be concrete, specific ends, such as landing a particular job or selling a million dollars worth of life insurance next year. They also can be abstract, specific directions in which the Decision Maker wants to move, such as increasing his or her self-reliance or improving some skill or other. For the latter there is no clear endpoint; timely movement in the proper direction is

itself the goal. Goals also can be a mix of these two--desired states
of being that are identifiable but transient, such as being happy,
being reasonable, feeling successful. Here the combination of
appropriate movement to increase the frequency and duration of these
states, and periodic realization of the states define the goal. For
Dr. Smith, getting a promotion or earning high teaching ratings are
concrete (teleologic) goals, becoming an increasingly better
researcher and receiving increasing national recognition are
directional (teleonomic) goals, and feeling successful and content
with her career are a mix of the two. Of course, she also has goals
other than professional goals--writing publishable shortstories,
running a marathon, being a good daughter, buying a new TV, and so on.

The Action Image consists of the various plans that are in use at
any moment for achieving the various goals that the Decision Maker is
pursuing. Each plan is a sequence of behavior that uses as its
beginning point the incompatibility between the trajectory and
projected images, and that uses as its termination point the
anticipated elimination of that incompatibility as a result of
implementation of the behavior (Note 2). A hypothetical single plan
is diagrammed in Figure 2. The anticipated incompatibility is the
proximal boundary of the plan and the anticipated elimination of the
incompatibility is the distal boundary. The Decision Maker regards
the encapsulated behavior sequence (plan) as a unitary activity,
described as "trying to (prevent, achieve, acquire, avoid, forestall,
accomplish)" some event or state. Examples are "Trying to: 'keep my
job,' 'avoid bankruptcy,' 'get tenure,' 'set a new personal record in
swimming,' 'complete my book,' 'become a good father'." It is the
activities involved in 'trying to' that constitute the plan.

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Insert Figure 2 about here.

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Plans are abstract programs for action. Their concrete
behavioral manifestations are called tactics. Figure 2 shows how
tactics fit within the plan. Tactics are the specific, palpable
actions that are selected to facilitate implementation of a plan in
order to bring about progress toward a goal (publishing, getting a
grant may be tactics to get tenure). Some tactics are fairly well
defined at the time that a plan is adopted, designated T in the
figure. Some are less well defined, but will become better defined as
the time for their execution approaches ("I'll cross that bridge when
I come to it"), designated T*. Some are dependent upon each other, or
must be executed simultaneously, designated Ti and Tj. Some,
designated Tk1 or Tk2, are alternative ways to proceed, and they are
contingent upon local circumstances which dictate which tactics will
be used when the time comes. Of course, some plans will consist of
more or fewer components than illustrated in Figure 2, and there may
be various degrees of clarity about them during planning, as well as
various degrees of contingency among them (and between them and local
circumstances) as the sequence unfolds in time. However many there
may be, and however vaguely or clearly they are foreseen from the
beginning of plan adoption and implementation, the fact remains that
tactics are, in the vernacular, the "nitty-gritty" of goal seeking --
the specific, concrete behaviors that act upon the environment in the
interest of implementing the plan.

One also can consider competing plans for a specific goal. In
some cases one can become a tenured professor either by excellence as

a teacher or by excellence as a researcher. Which of various competing plans the Decision Maker adopts depends upon the degree to which they fit with other plans while offering the potential for success, and, perhaps, the degree to which they are attractive activities in and of themselves.

The Projected Image consists of the events and states that one anticipates will occur if one continues with the plans that currently are being implemented, i.e., if the behavioral status quo is continued.

This is called the projected image to convey the idea that it describes the anticipated future. One can anticipate what will happen (events and states) if one continues to behave in the present vein to accomplish adopted goals that comply with existing principles. The anticipation, the projected image, can be compared with the trajectory image's goals to see if they reasonably might be achieved if one continues on one's current course. For example, Dr. Smith's publication record may not be very good and she may become aware that if her current publication rate continues she will not get tenure.

Similarly, one can anticipate, with various degrees of certainty, what will happen if one changes behavior in specific ways (and one can even try out changes on a temporary basis in an attempt to reduce this uncertainty, e.g., living together before marriage or taking a potential job on a trial basis). This permits one to entertain possible changes in behavior that might promote goal achievement. For example, Dr. Smith may consider increasing her research efforts on her existing projects or undertaking new projects that have a potentially higher, faster publication yield. These possible changes serve as candidate plans for the action image.

## Types of Decisions

There are two types of decisions, <u>adoption decisions,</u> which a,e
about adoption or rejection of the facets for images, and <u>prog ess
decisions,</u> which are about whether an incongruity between the
trajectory and projected images is sufficiently small to warrant
remaining with the status quo, or whether the incongruity is so large
that changes must be made in order to reduce or eliminate it.
Progress decisions are special cases of adoption decisions.
Incompatibility of the two images casts doubt upon the effectiveness
of the the tactic to further the plan, the effectiveness of the plan
to attain the goal, or the effectiveness of the goal to satisfy the
principles that generated it. Because, as we shall see, doubt acts to
diminish attractiveness, this results in the attractiveness of the
present tactic, plan, or goal (and, sometimes, principle) being
discounted. Then, if the discounted attractiveness is less than would
be required for adoption of that tactic, plan, or goal (or principle)
were it being considered anew as a candidate, it is rejected and
replaced with a different, more attractive alternative.

Returning to our hypothetical Dr. Smith: she may have
professional service as a principle on her self image, becoming
President of the Academy of Management as a resulting goal, active
involvement in Academy affairs as a plan for achieving that goal, and
joining various academy committees, especially the committees involved
with the annual convention, as a tactic for implementing that plan.
These are all adoption decisions. After a few years she may become
aware that her progress toward her goal has been minimal. Upon
reflection she notes that she has not been chosen to be on the review
board of a major journal or to be in charge of part of the program for

a convention. Therefore, she may anticipate that her goal (and its principle) is in jeopardy and decide to modify her plan, to change her plan completely, or to reject the goal and find another way to satisfy the demands of her principles.

## Evaluative Criteria

There are two criteria for evaluating decisions:

--Compatibility, which is the degree to which candidates are congruent with existing components of their respective images and with the images to which their respective images are subordinate (i.e., the action image is subordinate to the trajectory image which in turn is subordinate to the self image). This criterion favors candidates that will contribute to the continued smooth operation of the decision maker's life -- that is, the less their potential to impede ongoing activities and goal seeking, the more attractive they are.

--Profitability, which is the degree to which a candidate appears to offer attractive consequences contingent upon successful achievement (in the case of goals), implementation (in the case of plans), or execution (in the case of tactics). Profitability refers to attractive consequences over and above congruence alone.

Adoption decisions rely upon either compatibility alone or compatibility and profitability together, depending upon the strategy that is in use. Progress decisions, on the other hand, rely solely upon the compatibility of the trajectory and projected images. When incompatibility is large enough to matter, it 'triggers' reexamination of the status quo (existing tactic, plan, etc.). A progress decision is, in fact, no more than a reaction to an alarm set off by incompatibility between what is desired (the trajectory image) and what is anticipated (projected image). The corrective to this

reaction is an adoption decision.

When evaluating compatibility or profitability, Decision Makers often recognize that their evaluations may be fallible. This recognition introduces doubt into the assessment of attractiveness. Doubt acts to dampen the Decision Maker's enthusiasm or dismay about the candidate's attractiveness by diminishing (discounting) that attractiveness prior to the decision about acceptance or rejection of the candidate. Similarly, in progress decisions, when there is incompatibility between the trajectory and projected images the attractiveness of the status quo is diminished by doubt. If this diminished attractiveness is less than would be required for adoption were the tactic, plan, etc. a new candidate, this triggers its rejection and adoption of an alternative to replace it. Doubt is, of course, like subjective probability, except that Image Theory makes no assumptions about its mathematical properties.

## Decision Rules

When one makes an adoption decision about a single candidate, the decision rule usually is whether the attractiveness of the candidate, deriving from its compatibility with its own and other image's facets exceeds the sufficiency threshold, and the decision rule is satisficing (Simon, 1957; 1976), i.e., if the candidate is sufficiently compatible it is adopted. However, even if the candidate's attractiveness fails to exceed the threshold, if the adoption decision is of great importance (Beach & Mitchell, 1978; Christensen-Szalanski, 1978, 1980), the decision may be subjected to a second rule which requires that the candidate's potential profitability also be considered. In this case, the candidate's adoption depends upon the combination of the attractiveness deriving

from compatibility and the attractiveness deriving from profitability; if the combination exceeds the sufficiency threshold (satisficies), the candidate will be adopted. (That is, sometimes high profitability can compensate for insufficient compatibility.)

When one has to adopt one candidate from among two or more alternatives the same two rules are applied. If one of the candidates is sufficiently compatible (satisfices) and the others are not, it is adopted and all the others are rejected. If more than one candidate survives the compatibility test, or if none survives but the decision is too important to drop, the profitability of each candidate is assessed and the one with the maximum combined (compatibility plus profitability) attractiveness is adopted. The latter, of course, is maximization.

When one makes a progress decision, the decision rule simply is whether or not the unattractiveness of the status quo resulting from comparing the trajectory and projected images warrants a change of behavior, goal, or even principle. Perhaps this should be called 'unsatisficing'.

It is tempting to think of compatibility and sufficiency as boiling down to something simple like the number of similar features shared by images or by candidates and existing image facets, or as the difference, in some distance sense, between them. Number of features and simple differences are appealing if only because they are easy to understand and to measure. However, more thought reveals that both are inadequate; compatibility and sufficiency must be conceived of in a much more wholistic, gestalt manner.

When one talks of one's goals or one's plans, or even of one's moment-to-moment tactical activities, one can, and does, talk of them

as individual elements. In reality, however, these elements are components of a complex meld that constitutes one's ongoing experience. As such, that experience forms a unitary story of where one has been, where one is going, and what one is doing. This story is more than merely its elements -- arising from them is a story line (a plot), and that story line, not the individual elements, is the ultimate criterion for whether sufficient compatibility exists or not. Just as one can tell when a story one is reading slips into fantasy or veers from its proper course, just as one can tell when something in the story does not ring true, so too can one detect and anticipate incompatibility in one's own ongoing experience. This is, in fact, a gestalt process in which the whole, the plot, is greater than the sum of the elements that contribute to it, and in which the acceptability of elements and plot twists is determined by their compatibility with the whole. As in perception, minor incompatibility may be tolerated, depending upon the circumstances, major incompatibility motivates efforts to reduce it or leads to rejection of the incompatible parts.

It is difficult to be very specific about the mechanism for assessing sufficiency of compatibility, clearly this has a top priority for future research. Perhaps it is related to people's demonstrated ability to evaluate the quality of analogies and metaphors (e.g., Holyoak, 1984; Glick & Holyoak, 1980), which turns on recognition of similarities among relations rather than similarities among elements. In this vein, Ortony's (1979) extension of Tversky's (1977) theory of similarity to cover metaphor might be a beginning. Ortony's view is compatible with Image Theory in that it assumes image-like knowledge representations. Metaphor is measured as the relative salience of matchable aspects of the entities being compared,

and the aspects can be quite abstract (i.e., function). Thus, the salience of matchable (abstract) aspects of a candidate and an image, or of two images might serve as a measure of compatibility. At least this is a plausible line to pursue.

Whatever line of thinking eventually proves to be the best for exploring it, compatibility is not simple. Perhaps the following will convey our view of its complexity: In the theater there is a stage design technique that uses a gauze-like cloth that can be stretched across the proscenium at the front of the stage. Sometimes this cloth, called scrim, is used as a movie projection screen; when the stage lights behind it are turned off the movie picture is clear and bold. But, when the stage lights are turned on the action on the stage can be seen through the weaker, but still discernible, picture on the scrim. Now, the analogy requires one to think of the moving picture on the scrim, especially the plot or story line of the movie, as how things ought to be, and the action on the stage, and the story the action conveys, as what is really going on. When the two are sufficiently congruent there is no difficulty. But, when the action's story deviates from the movie's story, something must be done -- a decision must be made about how to deal with the incongruity (incompatibility).

Compatibility and sufficiency, in various forms, are commonly encountered in psychology. They have been studied particularly in perception and cognition in terms of absolute and difference thresholds, pattern recognition, and intuition and insight in problem solving (Kling & Riggs, 1971). However, there is no model deriving from these studies that can serve as a heuristic to guide our thinking about compatibility or sufficiency (or satisficing) in the same way

that the prescriptive model of Maximization of Expected Value, and related notions, can serve as a heuristic for thinking about expected value (and maximization) in personal decision making.

Even for basic sensory processes, thresholds are contingent upon characteristics of both the subject upon whom the testing is done, and upon the circumstances under which the testing occurs. Similarly, the threshold for sufficiency for adoption and progress decisions is variable. Certainly, different Decision Makers differ in the characteristic levels of sufficiency they generally require. Within this, certainly the threshold for an individual differs for different contexts and for different sequences of previously occurring decisions. In short, sufficiency thresholds are neither constant across people, nor are they constant across time for the same person. Inconvenient as this may be from a research viewpoint, research simply will have to deal with it.

## Decision Strategies

In general, when adoption and progress decisions use strategies that rely on the attractiveness that derives from compatibility, they collectively are called nonanalytic decisions, and satisficing is the decision rule. When adoption decisions use strategies that rely on attractiveness deriving from both compatibility and profitability, they collectively are called analytic decisions and maximizing is the decision rule (Note 3).

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Insert Table 1 about here.

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In a preliminary study, we developed a set of short descriptions of how decisions could be made, decision strategies. These were given

to 56 undergraduates who evaluated each strategy in terms of the
'percent mix' of nonanalytic and analytic activity that was involved
in using it. On the basis of these evaluations the five strategies (1
= 86% nonanalytic, 2 = 68%, 3 = 49%, 4 = 40%, and 5 = 20%) in Table 1
were selected. Then 22 psychology majors who already had made a
decision about whether or not to go to graduate school (the 'real'
decision) and 42 Introductory Psychology students who were given a
story about a hypothetical student who was deciding about employment
(the 'hypothetical' decision), were asked to identify from among the
five strategies the one that most closely resembled the method they
had used, or would use, to make their decision. For both kinds of
decisions the most frequently identified strategy was number 2 (i.e.,
68% nonanalytic); identified by 73% of the 22 subjects in the real
decision condition and 66% of the 42 subjects in the hypothetical
decision condition. In short, both for real and for hypothetical
decisions, subjects favored nonanalytic strategies.

## Decision Contexts

Until now we have talked as though the decision to change from
the status quo to something new is triggered in some mechanical way by
insufficient compatibility between the trajectory and projected
images. However, research shows that things are not so simple (e.g.,
Christensen-Szalanski, 1984; Davidson & Beach, 1981). It is fairly
clear that the threshold for abandoning the status quo is
conservative. This means that when a plan (the behavioral status quo)
does not appear to be producing progress, when a goal (the desired
status quo) does not appear attainable, or a principle (the 'moral'
status quo) does not appear realistic, there is a bias toward
retaining it rather than rejecting it (Staw, 1981; Northcraft & Wolf,

1984; Brokner & Rubin, 1985).

The foregoing applies to decisions made in contexts in which one has an opportunity to instigate change or to stay with the status quo; what havve been called optional change decisions (Beach, Hope, Hownes & Campbell, 1982). Such decision contexts are far and away the most common ones that Decision Makers encounter. However, in some contexts there are deadlines or expiration dates that make it impossible to stay with the status quo. Sometimes these are imposed by other people and sometimes they are imposed by ourselves or by the ongoing progress and development of our lives. For example, when a student completes his or her education, some kind of job decision must be made. This involves deciding on a new course of action from a set of alternatives of which the status quo is not a member; what have been called nonoptional change decisions (Beach et al., 1982).

In the decision strategy experiment (Fig. 1) described above, it also was possible to examine decision context. For half of the subjects in the hypothetical decision condition the hypothetical student was described as already having an acceptable job (i.e., the status quo was viable). For the other half of the subjects the hypothetical student was described as unemployed and with pressing debts (i.e., the status quo was not viable). Of the 21 subjects who received the optional context description, 19% identified predominately analytic strategies as appropriate (strategies 3, 4, or 5). Of the 21 subjects who received the nonoptional context description, 48% identified predominately analytic strategies as appropriate ( $t = 2.09$, $df = 40$, $p < .025$). These results and the arguments made above suggest that the rule of thumb, but only that, is that optional change decisions tend to be made using nonanalytic

strategies and nonoptional change decisions tend to be made using analytic strategies, although nonanalytic strategies always are more highly favored.

## The Growth and Evolution of Images

We end with a discussion of where candidates for image membership come from and how images evolve over time as a function, primarily, of repeated nonanalytic adoption decisions.

The argument is that many of the major facets on our images are adopted fairly early in life. Subsequent candidates are evaluated in terms of how compatible they are with these earlier facets and usually are nonanalytically adopted or rejected. Remember, it is only when something goes considerably awry or when circumstances make a decision very important that analytic decisions are made at all.

There are three major ways in which candidates become options for adoption decisions: assimilation, emergence, and accommodation.

Assimilation. In assimilation (Piaget, 1930) the examples set by other people (models) serve as the major sources of candidates for adoption. This especially is true for youngsters -- the actions, stated ambitions, and avowed values of parents, teachers, and other significant adults have a strong influence upon the formation of young people's self and trajectory images. Similar influences are exercised by peers, and by books, movies, and television. When the child is very young, these candidates are assimilated uncritically and he or she often evokes benevolent mirth for being a small copy of Mom or a 'chip off the old block' version of Dad. Dr. Smith's parents, for example, both had professional degrees and successful careers. Very early on, going to college and to graduate school simply was assumed both by her parents and by Dr. Smith.

Adoption as a result of following instructions also is done wholesale by children. While a model's actions may speak louder than words, words also have their affect. Thus, by assimilation of what the models do and what they say, the rudimentary images begin to take form. Dr. Smith's parents read a great deal, took the children to museums, and held lively discussions about interesting, stimulating topics, and such activities came to be part of Dr. Smith's image of what her life should include.

Alexander Pope (1734/1980) said that "Just as the twig is bent, the tree's inclined" (p. 335), and certainly he was correct in regard to children's self and trajectory images. Although the principles or goals on the young child's images are easily adopted, later adoptions are constrained by these earlier facets, with the result that a 'mature' image is, in effect, an extrapolation of its earlier facets. This is because the criterion for adoption decisions is compatibility with existing facets. As more candidates are adopted there is increased constraint upon the acceptability of subsequent candidates, thus making later adoptions, the incline of Pope's tree, an outgrowth of the earlier ones, the twig's bent.

Assimilation also provides plans for the action image. This involves either adopting plans that other people use to attain their goals, or following some set of instructions such as advice, an instruction booklet, or training. The rule for adoption of a plan through assimilation is the same as for nonanalytic adoption of principles and goals, i.e., the plan must be compatible with the existing facets of the action image as well as with the facets of the self and trajectory images.

Tactics are often adopted through assimilation, but they do not

have much 'staying power'--they are easily dropped and replaced by other tactics. This is because they are less abstract and more easily buffeted by the constraints and necessities of moment-to-moment experience. For example, our Dr. Smith's plan for getting tenure may involve a variety of tactics. She could collaborate or not, do large field studies or tight laboratory studies, be involved in departmental politics or not, get grant money or not, and so on. Obviously the specific tactics involved must be keyed to the unique aspects of her particular department in its particular parent institution. If the tactics are inappropriate, there will be trouble sooner or later. When such trouble occurs, the tactic must be dropped and another adopted.

Nonanalytic adoption can be thought of as a bit like working a jigsaw puzzle. The compatibility requirement produces a fairly coherent whole, with the facets of the different images fitting together fairly well, and fittingness is the sine qua non for assimilation. But the jigsaw puzzle analogy also suggests another way of adding pieces: as pieces are fitted into the puzzle, their shapes constrain the possibilities for what can be used to fill the remaining holes. Indeed, the holes define the required pieces, and the puzzle solving process, guided by the holes, reduces to finding correctly shaped pieces to fill them. This suggests a second source, called emergence, for candidates for nonanalytic adoption.

Emergence. Emergence involves the evolution of new candidates as necessary additions to the images, i.e., necessary to fill the holes. Emergence is less mysterious than our puzzle analogy might make it seem. For principles and goals it simply means that a new candidate emerges because it is implied by existing facets of the images. For

example, if our Dr. Smith previously has adopted the goals of being a professional, being rich and famous, and patronizing the arts, it may well be that the goal of being married to a socially adept and highly attractive spouse emerges and is nonanalytically adopted simply because it is a compatible (by definition) adjunct of the existing goals. It fills a hole in the puzzle.

Emergence, as just described, is a common source for tactics. This is because tactics are part of the ongoing flow of local context behavior. Opportunities or constraints arise, circumstances change, people come and go, and Decision Makers take advantage of these conditions and mold their tactics to them, and, while this molding process is guided by the plan, it is not subject to much forethought or even to much immediate consideration.

Accommodation. The third source of candidates for adoption is accommodation (Piaget, 1930). It occurs through modification of a not-quite-acceptable candidate to make it conform to the constraints imposed by existing facets. For principles or goals, accommodation merely means that a candidate that is not compatible can be changed where necessary to make it fit better with existing facets rather than being rejected out of hand. This is a little like filing off parts of a puzzle piece and adding on bits here and there to make the piece fit.

For plans, accommodation means that old plans in one's repertory can be hauled out and changed to make them suitable for pursuing the present goal. This, in fact, is the most common form of plan formulation--sticking with known plans, modified as necessary, permits one to profit from experience.

For tactics, accommodation consists of tinkering with formerly

used tactics (often called 'response generalization') in order to make them work in the present context.

## Summary and Concluding Comments

The foregoing is a description of a Decision Maker who has the ability to act in light of his or her principles (self image), and who is able to consider the relative merits of candidate goals, plans and tactics (and, more rarely, principles) in terms of their compatibility with those principles and with each other, and, sometimes, in terms of the profitably of their contingent consequences (adoption decisions). This Decision Maker also has the ability to imagine both an ideal future (trajectory image) and an anticipated future (projected image). Comparison of the latter two permits the Decision Maker to evaluate progress toward goal achievement (progress decisions). Thus, for example, if failure to achieve a particular goal is anticipated, the Decision Maker either modifies or replaces the plan that currently is in use to attain that goal, or, if no plan seems adequate, rejects or modifies the goal itself. Similarly, if the attainment of goals related to a particular principle is thwarted repeatedly, the Decision Maker rejects or modifies the principle.

The Decision Maker does all of this either by actively, carefully, exhaustively considering both the degree to which the candidate is compatible with existing principles, goals, plans or tactics and the potential profitability of adopting them (analytic strategies). More frequently, however, he or she does it by passively, roughly, sketchily considering only the compatibility of the candidate with existing image facets or the compatibility of the trajectory and projected images with each other (nonanalytic strategies). Compatibility and profitability define attractiveness,

which is discounted by the Decision Maker's doubt about the
evaluations that give rise to it.  Discounted attractiveness deriving
from compatibility is subjected to the satisficing decision rule, and
discounted attractiveness deriving from combined compatibility and
profitability is subjected to the maximizing decision rule.

The purpose of proposing Image Theory is to stimulate rethinking
about how decision making actually is done--not to provoke judgments
about whether decision making is or is not 'rational,' but to prompt
renewed consideration of how people go about it.  Image Theory departs
from conventional thinking about decisions in eight major ways:

(1) Guiding principles such as morals, beliefs, values, and the
like are given an important role.  Many of these principles are formed
at an early age and are nonanalytically adopted as part of the self
image.  However passively they may be accepted they play a major role
thereafter because they constrain and determine most of the important
decisions made in the course of a Decision Maker's life.

(2) Goals rather than alternative courses of action (plans) are
the main focus of decision making; plans are dictated by goals.

(3) Nonanalytic decision making not only occurs, it is the way in
which most decisions are made.  Analytic decision making is more of a
back-up system that is used when nonanalytic decisions do not appear
to be working out, or when there clearly is a lot at stake.

(4) Compatibility among principles, goals, plans, and tactics is
more influential in decision making than is profitability if only
because Decision Makers rely more upon nonanalytic decision making
than upon analytic decision making.

(5) The concept of 'satisficing' is linked to other theoretical
constructs such that it takes on a richer meaning that it has had

heretofore.

(6) Behavior does not change simply because one course of action (goal or plan) is more attractive than what one is doing now; optional change decisions are conservative and the attractiveness of change must substantially exceed that of the status quo before the change will be occur.

(7) Image Theory provides a framework of greater depth than is available in conventional approaches. It gives consideration to the origin of decision alternatives, be they goals, plans or tactics, and it allows for the monitoring of implementation as well as the revision of earlier decisions in the light of their success or failure.

(8) Finally, Image Theory's most important departure from conventional thinking is in the overall picture it provides about decision making and the Decision Maker. It says that Decision Makers adopt and implement plans to reach goals and, thereby, to satisfy their principles. Most day-to-day decisions involve compatibility evaluations and the satisficing decision rule. Sometimes, when decisions are important or things go so awry that one must 'think through' how to deal with the failure, gains and losses are considered, and the maximizing rule is used. For the most part, however, the attempt to use high-powered, very precise, maximizing models to describe day-to-day decisions is inappropriate because it simply is not how most such decisions are made.

## Notes

1.  No doubt the structure of one's self image is complex, with some principles being subordinate to others, and those subordinate to yet others, and so on, with what is subordinate to what being dependent upon current circumstances. We have spent a good deal of time thinking about how theoretically to handle this mercurial state of affairs and have concluded that we lack the ability to deal with it. Therefore, we have elected to make the probably incorrect, but more tractable, working assumption that all principles are equal in status, importance, imperativeness, or whatever.

2.  It sometimes is the case that when a new goal is adopted it is so compatible with existing goals that it can be attained in the course of attaining the existing goals--no plan revision or new plan is necessary. However, when a new goal requires plan change or a new plan, or when a current plan fails to produce progress toward attainment of its goal, the trajectory and projected images become incompatible, thus prompting adoption of a new plan.

3. It is here that Janis and Mann's (1977) conflict model of decision, which which in large part is a model of how Decision Makers avoid making analytic decisions, fits into Image Theory. When nonanalytic strategies are inappropriate or when they fail, the Decision Maker must entertain use of analytic strategies. However, analytic strategies require care and thoroughness, which is psychologically costly. Therefore they are resisted (Beach & Mitchell, 1978; Christensen-Szalanski, 1978, 1980). The behavioral manifestations of this resistance are described by the conflict model.

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# Footnote

Table 1

The five decision strategies selected on the basis of 56

subjects' evaluations on a scale from 100% Nonanalytic and 0%

Analytic, to 50%-50%, to 0% Nonanalytic and 100% Analytic.

Strategy 1 (86% Nonanalytic): Consider your
decision and select a time-honored rule about how to
make such decisions. Examples of such rules are,
"Better safe than sorry," or "A bird in the hand is
worth two in the bush," or "Nothing ventured, nothing
gained."
Strategy 2 (68% Nonanalytic): Carefully think
about the decision and identify the possible decision
options. For each option, imagine what might result
from implementing that decision and how those results
would fit in both with your value system and with the
other things you are trying to accomplish. From among
the possible decision options, implement the one that
feels like it would best fit in with your values and
with the other things you are trying to do.
Strategy 3 (49% Nonanalytic): Carefully think
through the decision. Identify the decision options
and consider in your mind the pro's and con's of each
option. In your mind, balancer each option's pro's
against its con's. From among the possible decision
options, implement the one that you think appears to
have the greatest balance of pro's.
Strategy 4 (40% Nonanalytic): Carefully think
through the decision. Identify the possible decision
options and use pencil and paper to list each option's
pro's and con's in two separate columns. Balance each
option's pro's against its con's by repeatedly crossing
out one pro and one con of equal importance from each
column until you run out of either pro's or con's.
From among the possible decision options, implement the
one that has the greatest balance of pro's.
Strategy 5 (20% Nonanalytic): Carefully follow
the step-by-step instructions in a textbook that
explains how to use decision analytic techniques from
Decision Theory, Operations Research, etc. Identify
the possible decision options, evaluate them, and
perform the appropriate mathematical computations
following the formulas in the book and using a
calculator, pencil and paper. From among the possible
decision options, implement the one that is dictated by
the results of the analysis.

Figure Captions

Figure 1.   The elements of Image Theory.

Figure 2.   A hypothetical plan with its component tactics.

Figure 1

**Images**
>   Self (principles)
>   Trajectory (goals--ideal events & states)
>   Action (plans & tactics)
>   Projected (anticipated events & states)

**Decisions**
>   Adoption (selection of candidates for images)
>   Progress (comparison of projected and trajectory images)

**Contexts**
>   Optional (status quo is an available alternative)
>   Nonoptional (status quo is not an alternative)

**Evaluative Criteria**
>   Compatibility ('fit' of candidates with images)
>   Profitability (benefits/costs of consequences)
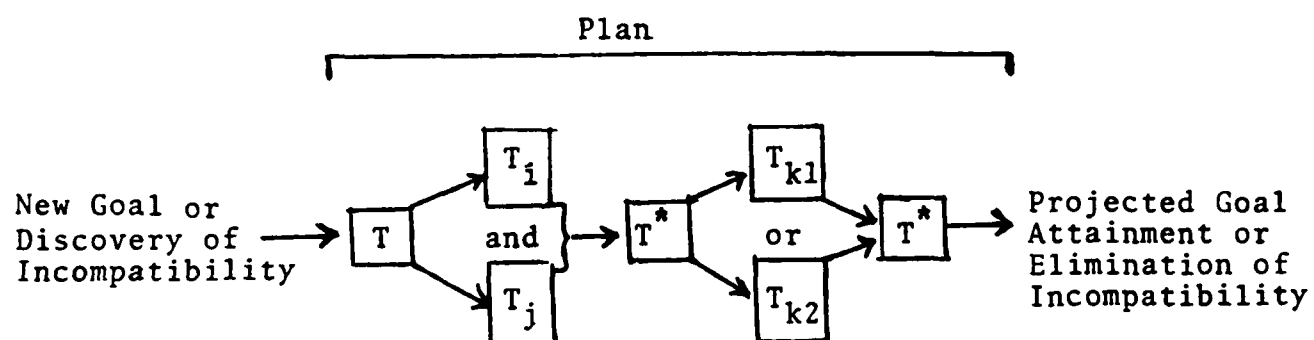
Attractiveness- Discounted by Doubt

**Decision Rules**
>   Satisficing
>   Maximizing

**Decision Strategies**
>   Nonanalytic
>   Analytic

Figure 2



Figure 2

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